

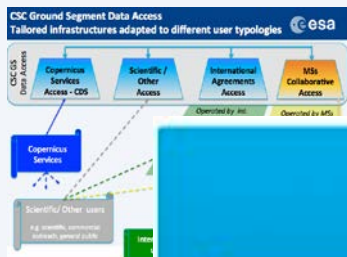
Sentinel-1 Online Data Access



J. Martin

Ground Segment and Mission Operations Department,
Earth Observation Programmes Directorate,
European Space Agency

Sentinel Network Data Access Landscape



OPEN AND FREE

COMING SOON

COMING SOON

sentinel data hub

Scientific and Other Access

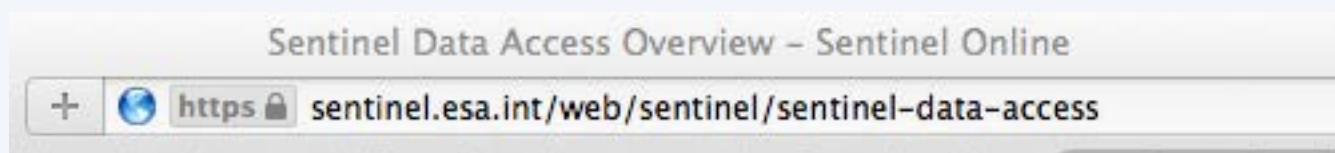
Copernicus
The European Earth Observation Programme

Access for Copernicus Services

Access for International Agreements

Access for Collaborative Ground Segment

click to access data



Open & Free 'Science and Other' Data Access – Initial Operations



The screenshot shows the Sentinel-1 Scientific Data Hub interface. At the top, it says "Welcome to the Sentinel-1 Scientific/Other use Data Hub". Below this, there is a section for "Level-0 products and Level-1 Ground Range Detected (GRD) products" and "Level-1 Single Look Complex (SLC) products". A "Latest News" section lists several maintenance windows and initial opening dates. On the right, there is a large graphic of the Earth with satellite icons, and a section titled "TERMS AND CONDITIONS FOR THE USE AND DISTRIBUTION OF SENTINEL DATA" with a "Enter the HUB" button.

- Open and Free T&C's published
- Self Registration and Sample Products open since S-1A launch
- Routine Data flow opened on 3rd October
- Rolling Archive
 - target of latest 2 months data
 - achievement of full population will be progressive
 - no timeliness guarantee
- Quota restriction of 2 concurrent downloads to ensure bandwidth availability for all users

Open & Free 'Science and Other' Data Access – Initial Operations



The screenshot shows the Sentinel-1 Scientific Data Hub interface. At the top, there are navigation tabs: Overview, Search, Profile, Cart, and About. Below the map, there is a search bar with the text 'Italy' and a search button. The search results display a list of products, including their dates, instrument types, and sizes. The products listed are:

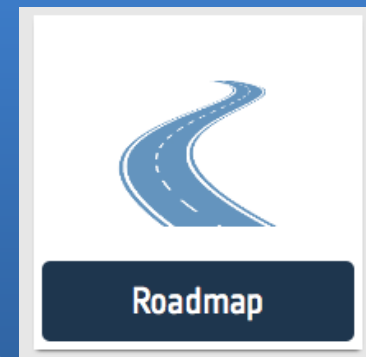
- Date : 2014-10-06T17:11:35.337Z, Instrument : SAR-C, Mode : IW, Satellite : Sentinel-1, Size : 1 GB
- S1A_IW_GRDH_1SDV_20141006T171200_20141006T171225_002712_00308D_006A
[https://sclhub.esa.int/dhus/odata/v1/Products\('b292f1d8-a8f3-4b3e-8024-2794e88ad478'\)/\\$value](https://sclhub.esa.int/dhus/odata/v1/Products('b292f1d8-a8f3-4b3e-8024-2794e88ad478')/$value)
- Date : 2014-10-06T17:12:00.337Z, Instrument : SAR-C, Mode : IW, Satellite : Sentinel-1, Size : 1 GB
- S1A_IW_GRDH_1SDV_20141006T171225_20141006T171250_002712_00308D_7AD3
[https://sclhub.esa.int/dhus/odata/v1/Products\('53b108d8-70ac-4be1-a533-9a400c7e9bfb'\)/\\$value](https://sclhub.esa.int/dhus/odata/v1/Products('53b108d8-70ac-4be1-a533-9a400c7e9bfb')/$value)
- Date : 2014-10-06T17:12:25.337Z, Instrument : SAR-C, Mode : IW, Satellite : Sentinel-1, Size : 1 GB
- S1A_IW_GRDH_1SDV_20141006T171250_20141006T171315_002712_00308D_3737
[https://sclhub.esa.int/dhus/odata/v1/Products\('9cf264de-66fe-45ba-8497-e2494fb7c632'\)/\\$value](https://sclhub.esa.int/dhus/odata/v1/Products('9cf264de-66fe-45ba-8497-e2494fb7c632')/$value)
- Date : 2014-10-06T17:12:50.337Z, Instrument : SAR-C, Mode : IW, Satellite : Sentinel-1, Size : 1 GB
- S1A_IW_GRDH_1SDV_20141006T171315_20141006T171340_002712_00308D_06C0
[https://sclhub.esa.int/dhus/odata/v1/Products\('b6189b2a-00a5-42f6-8c76-5aab2161dc82'\)/\\$value](https://sclhub.esa.int/dhus/odata/v1/Products('b6189b2a-00a5-42f6-8c76-5aab2161dc82')/$value)
- Date : 2014-10-06T17:13:15.338Z, Instrument : SAR-C, Mode : IW, Satellite : Sentinel-1, Size : 1 GB
- S1A_IW_GRDH_1SDV_20141006T171340_20141006T171405_002712_00308D_1757
[https://sclhub.esa.int/dhus/odata/v1/Products\('15f228fc-1867-4d81-aeff-395cfd6fc5e0'\)/\\$value](https://sclhub.esa.int/dhus/odata/v1/Products('15f228fc-1867-4d81-aeff-395cfd6fc5e0')/$value)
- Date : 2014-10-06T17:13:40.336Z, Instrument : SAR-C, Mode : IW, Satellite : Sentinel-1, Size : 1 GB
- S1A_IW_GRDH_1SDV_20141006T171405_20141006T171422_002712_00308D_DD84
[https://sclhub.esa.int/dhus/odata/v1/Products\('da2350f3-ab74-469d-9a7a-c2f84376dcd4'\)/\\$value](https://sclhub.esa.int/dhus/odata/v1/Products('da2350f3-ab74-469d-9a7a-c2f84376dcd4')/$value)

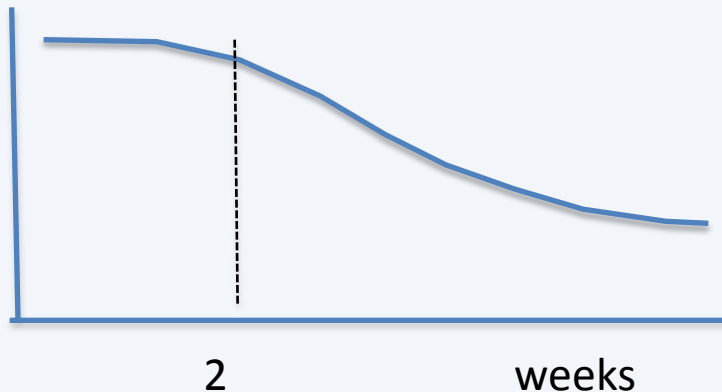
- Samples of all product types available (SLC, GRDM, GRDH, RAW)
- Since site opening ~ 4000 users registered
- Currently > 6000 downloads per week
- Total volume of data disseminated ~ 80 TB

Open & Free 'Science and Other' Data Access - Feedback

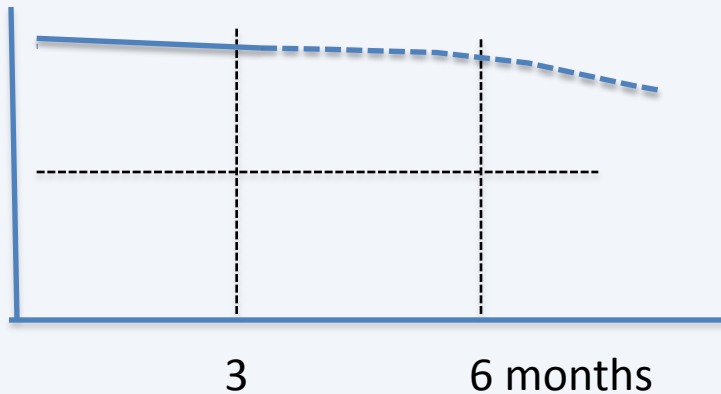


- Generally positive feedback
 - Simple search and download web interface
 - Good download rates to many users
 - Many users have already discovered how to automate and batch download products including subsets
- Some misunderstandings
 - Rolling archive system access vs. long term access
 - Expectations for full population at day 1 (vs. sample datasets promised)
 - Design oriented for batch download rather than interactive single product selection
- Some shortcomings
 - Initial ingest performances underestimating e.g. zip management for very large products
- Some bugs
 - Reactivity of some functions on UI
 - Compatibility with old browser versions
- Some new requirements
 - Interferometric pairs support requested
 - Further API functions requested





Initial Ingestion Performances



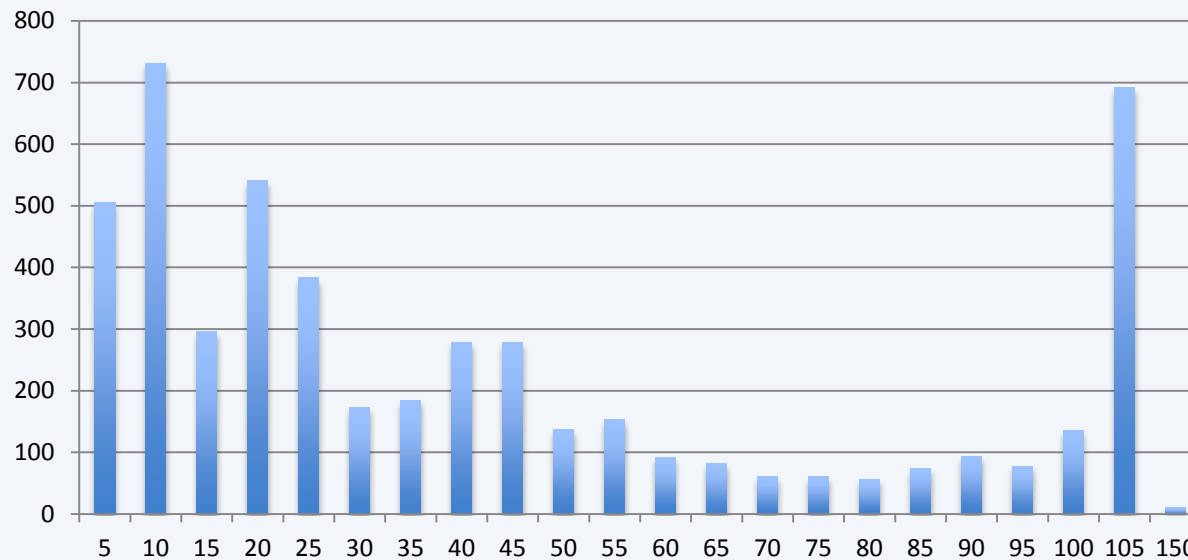
Improved Ingestion Performances

- Initial Observations
 - Un-optimised database access for some functions
 - Some tasks not properly parallelized
- Since 8th Dec
 - Much Improved performances
 - Full characterisation ongoing to establish rolling archive limits
 - Further optimisations scheduled

Initial Observations from S1A Ramp-Up – Download Performances



**Histogram of Download Bandwidth Achieved
per download (Mb/s) based on last 6000
downloads**



@ 10Mb/s

2GB GRD: 30 mins

8GB SLC: 2 hours

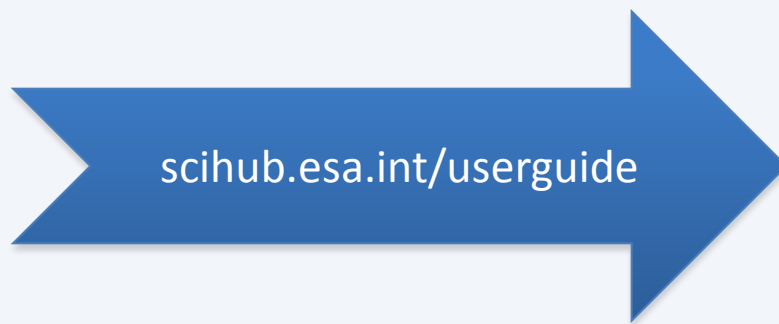
@ 100Mb/s

2GB GRD: 3 mins

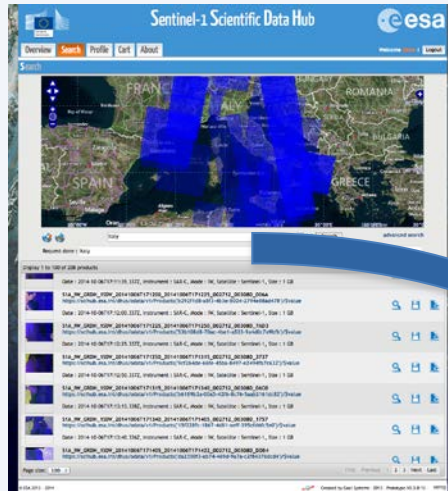
8GB SLC: 12 mins

- New Version of SW put in operations since 8th December:
 - complete daily production of Sentinel-1 Level 0, and Level-1 products in acquisition mode IW, EW, SM now routinely published
 - downtime has been used to complete a reset of the archive, and allow a re-indexing of additional relevant metadata
 - re-publication of the past products has been prioritised towards L1 SLC
 - all SLC since the 3rd of October (more than 1800) are already available online.
 - all L1 GRD products acquired from the 3rd of October to the 4th of December will follow a gradual upload as a background activity and will generally prioritise from the most recent to the oldest.

- Additional New Features:
 - Indexing of RelativeOrbitNumber to facilitate SLC pair selection
 - Partial (Byte-Range) download to be implemented for recovery of failed transfers
 - Examples / scripts now published



Rolling Archive Access API Now Available



```
DHUS — vim — 91x27
#export QUERY_STATEMENT='echo "${QUERY_STATEMENT}" | sed '
#--- Prepare query polygon statement
if [ ! -z $x1 ]; then
export GEO_SUBQUERY='LC_NUMERIC=0; printf "AND+( footprint:\\"Intersects(POLYGON((
%.13f %.13f,%.13f %.13f,%.13f %.13f,%.13f %.13f )))\\" $x1 $y1 $x2 $y1 $x2 $y2
` $x1 $y2 $x1 $y1 `
else
export GEO_SUBQUERY=""
fi
#- ... append on query (without repl
export QUERY_STATEMENT=${QUERY_STATEMENT}+"${GEO_SUBQUERY}&rows=10000&start=0"
#--- Select output format
#export QUERY_STATEMENT+="&format=json"
#--- Execute query statement
/bin/rm -f query-result
mkdir -p ./output/
set -x
${WC} ${AUTH} --output-file=./output/.log_query.log -o query-result "${QUERY_STATEMENT}"
set +x
```

- DHuS Discovery interface accessible via Open Search (Solr) API
 - ✓ Geographical (polygon) search capability
 - ✓ Freetext and Precise search against indexed metadata
- DHuS Download interface using Open Data (OData v2) API
 - ✓ Alternative Simple filters set (e.g. ingestionDate)
 - ✓ Subset of files (e.g. manifest download)
 - ✓ Inspection of data elements even within a file

- Rolling Archive access to S-1A PDGS production at <http://scihub.esa.int/>
- Scripting APIs Now available
- Ongoing evolutions and improvements to Data Hub Service

